Landsat 7 Processing System CDR

• Introduction	J. Henegar
• Design Overview	R. Schweiss T. Aslam
• LPS Hardware Architecture	C. Brambora
• LPS Operational Scenarios	R. Schweiss
• SWCI Detailed Design	J. Hosler D. Crehan
• System Testing	J. Henegar
• Acceptance Testing	EDC
• Facilities	EDC
• Conclusion	J. Henegar

Training, Maintenance, and Transition
Build Implementation Plan
Software Sizing
LPS Schedules

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Training, Maintenance, and Transition

- LPS personnel are working closely with EDC personnel to keep operations and maintenance personnel involved in the LPS design and implementation
- LPS Transition Plan will be developed by GSFC with support from EDC (draft 2/96) to document:
  - O&M personnel Training Approach
  - Transition Approach
  - Roles and Responsibilities of organizations
  - Plan for providing/acquiring products to support transition
  - Training Requirements and support
  - Problem reporting and resolution procedures
  - Activities and milestones for transition

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Training, Maintenance, and Transition

- LPS Installation Plan will be developed by GSFC with support from EDC (draft 2/96) to document:
  - Installation Strategy and checkout
  - Organization support required for installation
  - Problem report and resolution procedures
  - Activities and milestones for transition
- LPS Operations and Support Plan is expected to be generated by EDC to discuss sustaining engineering activities such as: logistics, CM etc.

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Build Implementation Plan

Build Plan Rationale

- **Release 1**
  - **Build 1**
    - » **Functionalities to support CCSDS and BCH supporting the instrument I&T**
  - **Build 2**
    - » **Support External Interface Testing**

- **Release 2**
  - **Build 3**
    - » **Requirements fully met**

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
General		Approved enhancements and problem correction	Approved enhancements and problem correction
	Common Basic Database Routines		
		Common Database Subinterval Information Extraction	
	Log Message Routines		
	Common Process Routines		
		Common FIFO Routines	
	Common Shared Memory Routines		
	Common Semaphore Routines		
	Common Time Routines		

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
User Interface			Raw Data Capture Forms
			Level 0R Processing Forms
		Modify LPS Configuration Table Form	
		Modify LPS Parameters Tables Form	
			Modify LPS Thresholds Tables Form
			Data Receive Summary Form
			LPS Processing Q/A Form
			Data Transfer Summary Form
			Manage Files Form
			Control DAN Transfer Form
Database	Table/Script Generation		
		Indexing	
		Triggers	
			Performance
			Fine Tuning

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Management and Control	Control Level 0R Processing		
			Generate Metadata
			Generate LPS Processing Q/A Report
			Automatic Data Capture
			Ingest Capture Schedules
			Ingest IAS Parameters
Raw Data Capture	Receive Raw Wideband Data		
			Restage Raw Wideband Data
			Save Raw Wideband Data
		Delete Raw Wideband Data	
			Generate Data Receive Summary Report
			Data Transmit (Test)
		Update RDCS Accounting Table	
			Generate Tape Labels
		Receive Raw Wideband Parameters	

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Raw Data Processing	Perform SCLF CADU Sync		
	Align Bytes		
	Deinvert Data		
	Perform PN Decode		
	Perform CRC Check		
	Perform RS EDAC		
	Identify Fill CADUS		
	BCH EDAC		
	Detect VCID Change		
	Failed CADU Trouble File		
		CCSDS Parameters	
			RDP Thresholds

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Major Frame Processing	Identify VCDUs		
		Extract PCD Bytes	
	Identify Major Frame		
	Extract Major Frame Time		
	Determine Subintervals		
	Collect Quality and Accounting		
		Deinterleave and Reverse Bands	
		Align Bands	
	Create MSCD File		
		Create Calibration File	
		Sensor Alignment/MFP Parameters	
			MFP Thresholds

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Build Implementation Plan

	BUILD 1	BUILD 2 / REL 1	BUILD 3 / REL 2
Payload Correction Data Processing		Extract Information Word	
		Determine Majority Vote Word	
		Assemble Minor Frames	
		Assemble Major Frames	
		Build PCD Cycle	
		Create PCD File	
		Determine Scenes	
		Report Scene Information	
			Report Bands Present
		PCD/Scene Parameters	
			PCD Thresholds

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Software Sizing Estimates

	DSI	B1	B2	B3
Analysis Tools	9300	3715	4715	870
Database	1300	500	400	400
Globals	7650	5460	2190	0
RDCS	4200	1320	1380	1500
RDPS	6750	6420	150	180
MFPS	8400	5955	2085	360
PCDS	7950	0	7410	540
IDPS	7000	0	6000	1000
MACS	7500	2370	150	4980
LDTS	7350	900	4050	2400
Net Total	67400	26640	28530	12230
CCRs (20%)		0	5328	8152
Total		26640	33858	20382

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Schedule

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Acronyms

ACCA	Automatic Cloud Cover Assessment
ADP	Attitude Data Points
Ao	Operational Availability
ANSI	American National Standards Institute
AOS	Advanced Orbiting Systems
API	Applications Programming Interface
BCH	Bose-Chaudhuri-Hocquenghem EDAC
BER	Bit Error Rate
CADU	Channel Access Data Unit
CASE	Computer Aided Software Engineering
CCA	Cloud Cover Assessment
CCB	Configuration Control Board
CIS	Centralized Information System
COTS	Commercial Off-the-Shelf
CPU	Central Processing Unit
CCSDS	Consultative Committee on Space Data System
CLCW	Command Link Control Word
CRC	Cyclic Redundancy Check
CRUD	Create, Retrieve, Update, Delete
CVCDU	Coded VCDU
DAMT	Distributed Application Monitor Tool
DAN	Data Availability Notice
DBMS	Database Management System
DD	Data Dictionary
DDE	Data Dictionary Entry
DDF	Data Distribution Facility
DDL	Data Definition Language
DFCB	Landsat & System, Data Format Control Book
DFD	Data Flow Diagram
DPCP	Distributed Process Control Program
DSI	Delivered Source Instruction
DSN	Deep Space Network
DSP	Digital Signal Processing
DTA	Data Transfer Acknowledgment
ECS	EOSDIS Core System
EDC	EROS Data Center
EDAC	Error Detection and Correction
EDP	Ephemerus Data Points
EOL	End of Line
EOSDIS	Earth Observation Data Information System
ER	Entity Relationship
ERD	Entity Relationship Diagram
EROS	Earth Resources Observation System
ESMO	Earth Science Mission Operations
ETM+	Enhanced Thematic Mapper Plus (instrument)
EPA	Euler Parameters
FDDI	Fiber Distributed Data Interface
FHS ERR	First Half Scan Error
FTAM	File Transfer Access and Management
FTP	File Transfer Protocol
F&PR	Functional and Performance Requirements
F&PS	Functional and Performance Requirements
GByte	Gigabyte
GCI	Geocentric Inertial
GHA	Greenwich Hour Angle
GOTS	Government Off-the-Shelf

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Acronyms (con't)

GSFC	Goddard Space Flight Center
GTSIM	Generic Telemetry Simulator
GUI	Graphical User Interface
HDF	Hierarchical Data Format
HDS	Horizontal Display Shift
HWC	Hardware Component
HWCI	Hardware Configuration Item
IAS	Image Assessment System
ICD	Interface Control Document
ID	Identification
IDD	Interface Data Description
IDPS	Image Data Processing Subsystem
IM	Information Modeling
IMU	Inertial Measurement Unit
IPD	Information Processing Division
ISO	International Organization for Standardization
Kbps	Kilobits per second
LAN	Local Area Network
LCC	Life-cycle Cost
LDTS	LPS Data Transfer Subsystem
LGS	Landsat 7 Ground Station
LPS	Landsat 7 Data Processing System
LP DAAC	Land Processes Distributed Active Archive Center
LRU	Line Replaceable Unit
LZP	Level Zero Processing
MACS	Management and Control Subsystem
Mbps	Megabits per second
MFPS	Major Frame Processing Subsystem
MSCD	Mirror Scan Correction Data
MDT	Mean Downtime
MJF	Major Frame
MOC	Mission Operations Center
MO&DSD	Mission Operations and Data Systems Directorate
MTBF	Mean time between failures
MTTR	Mean time to repair
MTTRes	Mean time to restore
NASA	National Aeronautics and Space Administration
NCC	Network Communication Center
NHB	NASA Handbook
NCSA	National Center for Supercomputing Applications
NMAS	Martin Marietta Astro Space
NMOS	Network Mission Operations Support
NOAA	National Oceanic and Atmospheric Administration
PCD	Payload Correction Data
PCDS	PCD Data Processing Subsystem
PN	Pseudo-Random Noise
QA	Quality Assurance
RAID	Redundant Array of Inexpensive Devices
RAM	Random Access Memory
RDCS	Raw Data Capture Subsystem
RDPS	Raw Data Processing Subsystem
RMA	Reliability, Maintainability, and Availability
RMS	Root, Mean, Square
R-S	Reed-Solomon (error detection and correction scheme)
RT	Real Time
SCCS	Source Code Control System

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Acronyms (con't)

SCLF	Search, Check, Lock, Flywheel
SCN DIR	Scan Direction
SD	System Design
SDL	Storage Definition Language
SDS	System Design Specification
SGI	Silicon Graphics, Incorporated
SHS ERR	Second Half Scan Error
SLDPF	Spacelab Data Processing Facility
SMP	Systems Management Policy
SN	Space Network
SQL	Structured Query Language
SRR	Software Requirements Review
SSDM	Structured Systems Design Methodology
STDN	Spaceflight Tracking and Data Network
SV	Space Vehicle
SVR4	System V Release 4
SWCI	Software Configuration Item
TBD	To Be Defined/Determined
TBR	To Be Resolved
TDM	Telemetry Decommutation
UIL	User Interface Language
USGS	United States Geological Survey
UTC	Universal Time Coordinated
VCDU	Virtual Channel Data Unit
VCDU-ID	VCDU Identifier
VCID	Virtual Channel ID
VER	Version Number
VME	Versa Module European
WRS	World Reference System
WWV	Time Signal Radio Station with National Bureau of Standards information

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Instruction for Accessing LPS Documents

The following provides instructions for accessing the LPS CDR related documentation. If you have any problems or questions about accessing this information, please contact either Joy Henegar at 301-286-8415 or Bob Schweiss at 301-286-1223.

The following LPS Documentation, in MS Word 5.1a format, is available for review:

- LPS Detailed Design Specification (DDS)
- LPS Interface Definition Document (IDD) (for internal LPS Subsystems)
- LPS-IAS Interface Control Documentation (ICD)
- LPS System Integration and Test Plan
- LPS Build Implementation Plan
- LPS User's Guide (Preliminary version)
- LPS Output Files Data Format Control Book (DFCB)

Instructions for obtaining the document from your Macintosh follow (GSFC site only):

Click on the APPLE icon - upper left hand corner of the screen
Drag to CHOOSER from the Apple menu
Click on the APPLESHARE icon
Click on !GODDARD BACKBONE (lower box on the left)
Click on the box on right
Type in the letter 'L'
Double click on LANDSAT PROCESSING SYSTEM
Log on as a GUEST. No password is necessary if you log on as a guest.
Click on the icon LPS REVIEW FOLDER (probably to the right of the screen)

Information for ftp transfers:

1) Node or Host Name:	lps-server.gsfc.nasa.gov
2) Login or Username:	anonymous
3) Password:	not needed for anonymous login
4) Directory:	LPS Review Folder

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